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PREPOSITIONING:  
A LOGISTICS CONCEPT FOR THE AEF

by

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## *Preface*

The Expeditionary Aerospace Force (EAF) is the Air Force's rapid deployment capability of the future. Logistics will play a major role in the success of the EAF, therefore, any innovative logistics concepts that directly impact the deployment of EAF forces are needed.

Prepositioning of cargo is not a new concept, but one which can be used in a new way to project forces rapidly. The Air Expeditionary Force Battlelab requested an ACSC research project on the validity of prepositioning for the EAF. This paper is my attempt to steer the Battlelab into more focused research on what to preposition and where.

Major Steven Purtle, my faculty research advisor, was a great help in this effort. He was a sounding board for ideas and helped me remain focused on the main issues. I offer my thanks to him.

### ***Abstract***

The Air Force is embarking on a new method of force projection, that of the Expeditionary Aerospace Force (EAF). Like any new operational application, logistics plays a significant role in its success or failure. So the adaptation of agile logistics concepts is a crucial part of the EAF.

The shortage of strategic airlift and the limited time allowed to deploy an EAF lead to the necessity of cutting the logistics tail and/or saving pipeline time during deployment. Prepositioning of cargo may be one solution to saving time and cutting some of the logistics tail. The question is what to preposition and where – in theater at a fighter base, at a depot, at a regional contingency center, or at a strategic aerial port in the continental United States (CONUS) or in theater. The focus of this paper will be on determining if prepositioning is a viable option and if so, what common items can be prepositioned and where.

The methodology used is a survey of literature on the Air Expeditionary Force (AEF) concept, the new EAF concept, prepositioning of assets by the Army or Air Force, and other related topics. Interviews with colleagues were also used to obtain current data and to share ideas.

This paper shows that prepositioning of assets is a viable option that should be considered in the EAF construct. Small scale tests by the AEF Battlelab will be necessary to determine the best mix of what should be prepositioned and where.

## Chapter 1

### Introduction

*You will not find it difficult to prove that battles, campaigns and even wars, have been won or lost primarily because of logistics.*

—General Dwight D. Eisenhower

Changes in the world in the last decade have been felt very hard by the U.S. military forces. No longer faced with one major enemy and the Cold War, the military must respond to crises all over the globe at an increasing rate and with fewer troops and fewer forward bases. *A National Security Strategy for a New Century* states: “The complex array of unique dangers, opportunities and responsibilities outlined in this strategy are not always readily apparent as we go about our daily lives, focused on immediate concerns.”<sup>1</sup>

The *National Military Strategy of the United States of America* uses guidance provided for the military in the National Security Strategy to assess the strategic environment in which the military exists. From this assessment, the military’s strategy is formed. This strategy says that “strategic concepts are key ideas that govern our use of military force and forces as we execute the strategy of **Shape, Respond, Prepare Now**.”<sup>2</sup> These strategic concepts of strategic agility, overseas presence, power projection, and decisive force have been fully embraced by the Air Force in designing its force for the new millennium. Additionally, the Air Force has studied the *Joint Chiefs of Staff Joint Vision 2010* and is at work implementing many of its concepts. Joint Vision 2010 states



that all organizations must have less “startup” time between deployment and employment and be more responsive to contingencies.<sup>3</sup> “We will need organizations and processes that are agile enough to exploit emerging technologies and respond to diverse threats and enemy capabilities.”<sup>4</sup>

Joint Vision 2010 also describes four emerging operational concepts—Dominant Maneuver (sustained and synchronized operations), Precision Engagement (shaping the battlefield with precision), Full-Dimensional Protection (space, air, surface, and sub surface), and Focused Logistics (rapid crisis response).

In 1995 the Air Force began experimenting with a new concept, the Air Expeditionary Force (AEF). The AEF embraced the idea of an agile organization capable of supporting each of the Joint Vision’s operational concepts. The best description of the early AEFs is provided by then Brigadier General William R. Looney. “An Air Expeditionary Force is an airpower package (usually between 30 and 40 aircraft) that national command authorities may deploy to defuse a developing crisis situation, to quickly increase a theater’s airpower capability, or to maintain a constant theater airpower capability.”<sup>5</sup> He goes on to say that an AEF should launch from home station(s) within 24 hours of an execute order and be prepared to launch combat sorties in theater 48 hours later. Each AEF would be configured with basic capabilities of strike packages such as air superiority, precision strike, and suppression of enemy air defenses. Other capabilities could be added as needed.<sup>6</sup>

Later, the organizational concept of air and space expeditionary forces was included in the September 1997, *Air Force Basic Doctrine*. “Because of the reduction in overseas

military presence, expeditionary air and space forces that can mass quickly and move globally are critical to future military operations.”<sup>7</sup>

In August 1998, the Air Force further refined this concept and introduced a new construct known as the Expeditionary Aerospace Force (EAF) to be more responsive to crises and to enhance the quality of life for all airmen. Acting Secretary of the Air Force, F. Whitten Peters, said:

During the Cold War, the Air Force was a garrison force focused on containment and operating as wings primarily out of fixed bases in the United States, Europe and the Pacific. Over the last decade, we have closed many of those fixed bases, and our operations have been increasingly focused on contingency operations in which selected squadrons deploy from these locations to forward bare bases for the duration of the mission.<sup>8</sup>

The EAF, using the light, lean, and lethal concept, is the Air Force’s solution to this high operations tempo which is “burning out” many airmen.

The EAF concept was developed as a flexible option for crises or small scale contingencies. In the event of a major regional conflict, this concept will not be used. The theater war plans will be followed in that situation.

The basic construct of the EAF calls for 10 Air Expeditionary Forces consisting of geographically separated units that train together and have an integrated command and control structure. Each unit will be on call for about 90 days every 15 months, with two AEFs out of the 10 on call at any time and able to be in the crisis theater within 72 hours. Similar in makeup to the original AEF, each would contain a mixture of assets including fighter, bomber, attack, and support aircraft, thus supporting the Joint Chiefs of Staff’s Joint Vision 2010 concepts of dominant maneuver, precision engagement, and full-dimensional protection.

It is the Joint Vision 2010's concept of Focused Logistics in general, and how it is being applied specifically to the AEFs, that is the focus of this paper. "To optimize all three concepts, logistics must be responsive, flexible, and precise."<sup>9</sup>

### **Light, Lean, and Lethal**

Agile Combat Support is one of the Air Force's core competencies described in *Air Force Basic Doctrine*. "This includes all elements of a forward base-support structure: maintenance, supply, transportation, communications, services, engineering, security, medical, and chaplaincy."<sup>10</sup> To meet the AEF's concept of "light, lean, and lethal", the Air Staff combined the logistics portion of Agile Combat Support and the on-going Lean Logistics program and adopted what's known as "Agile Logistics". Major General Michael E. Zettler, the Air Force's Director of Maintenance, describes Agile Logistics as "the collective set of lighter, right-sized, and faster logistics capabilities that will enable us to rapidly deploy with sufficient capability to quickly generate and effectively sustain the deployed force."<sup>11</sup> He goes on to say, "If there has been a tougher challenge levied on the Air Force Logistics community in the past 30 years, I am not aware of it!"<sup>12</sup>

The most challenging part of the AEF for logisticians is how to be light and lean but still be lethal. The answer, provided by General Zettler is, "taking what you know you will need, and not taking what you might need."<sup>13</sup>

Improving our strategic mobilization processes will play a key role in making the EAF concept a success. The triad of traditional strategic mobility used throughout the past 50 years by the U.S. consists of strategic airlift, strategic sealift, and prepositioning of assets.

Strategic airlift plays a crucial role in every deployment. However, our nation's strategic airlift is extremely limited. Because of this, less than ten percent of Gulf War cargo was moved by airlift. This is one of the major reasons AEFs call for light and lean forces. As an alternative, strategic sealift moved over 90 percent of cargo for the Gulf War and all of our other major conflicts this century. Sealift is an extremely strong and valuable portion of our strategic mobility assets, but due to the nature of sealift, speed of movement is not always possible. Particularly for the very quick response timeline for AEFs—in theater within 72 hours—strategic sealift is not a viable option. Prepositioning of assets is an option to be explored and could be used to augment the strategic airlift shortfall.

The importance of strategic mobility, coupled with problem areas described in previous AEF research, led to this study of AEF logistics challenges. General Looney's research identifies the AEF's main problem areas as: access to host country airspace, access to host country bases, strategic airlift and refuelers, and movement of munitions.<sup>14</sup> Lieutenant Colonel Sheryl Atkins's research at the Naval War College identified four main logistics challenges for AEFs: reduce airlift from 10-12 C-5 equivalent loads to six, prepositioning as an option, follow-on airlift requirements, and in-theater transfer of supplies. General Zettler says, "it will only become a reality when we find ways to substantially cut initial deployment airlift and still retain the ability to generate tasked sorties."<sup>15</sup>

## **General Issue**

For the EAF concept to be successful, agile logistics concepts must be developed and implemented. Strategic airlift is the obvious choice for speed, range, and agility.

However, with a shortage of strategic airlift, each AEF needs a method for its light and lean mobilized forces to maintain its lethality.

### **Research Question**

Should the Air Force use prepositioned assets to augment strategic airlift during AEF deployments? If so, what types of items should be prepositioned and at what locations?

### **Limitations of the Research**

This research project is limited to no more than 30 pages, so the focus is general in nature. Details on specific units, or types of units, and their prepositioned equipment is not possible. Additionally, an experiment or test of prepositioned equipment at any location is out of the scope of this project.

Some locations to be considered for prepositioning require using C-130s for intra-theater lift. Because C-130s are theater combatant commander assets, there needs to be a review of plans for small scale contingencies and crises to determine if these theater assets can be made available for movement of AEF prepositioned assets. This review is beyond the scope of this research.

### **Summary**

This chapter provides an overview of the evolution of the EAF. To set the foundation for the remainder of this study, Chapter Two presents a review of literature on prepositioning in general and specifically its relation to deployments. Chapter Three draws some parallels between the Rapid Deployment Joint Task Force (RDJTF) of the early 1980s and the AEF of the late 1990s. Chapter Four suggests what should be prepositioned and where. Chapter Five describes some innovations to reduce deployment footprints. Chapter Six provides recommendations for the AEF Battlelab.

## Notes

<sup>1</sup> *A National Security Strategy for a New Century*, The White House, May 1997, p 29.

<sup>2</sup> *National Military Strategy of the United States of America—Shape, Respond, Prepare Now: A Military Strategy for a New Era*, 1997, p 19.

<sup>3</sup> *Joint Vision 2010*, Chairman of the Joint Chiefs of Staff, p 31.

<sup>4</sup> *Ibid.*

<sup>5</sup> Looney, B Gen William R., “The Air Expeditionary Force: Taking the Air Force into the Twenty-first Century”, *Airpower Journal*, No. 10 (Winter 1996): 4.

<sup>6</sup> *Ibid.*, p 4-5.

<sup>7</sup> Air Force Doctrine Document (AFDD) 1. *Air Force Basic Doctrine*, September 1997, p 72.

<sup>8</sup> Katzaman, SMSgt Jim, “Air Force Readies Itself for 21<sup>st</sup> Century”, *Air Force News Service*, 6 August 1998. One-line. Internet, 5 September 1998.

<sup>9</sup> *Joint Vision 2010*, p 24.

<sup>10</sup> AFDD 1, p 34-35.

<sup>11</sup> Zettler, Maj Gen Michael E., “Agile Logistics: The Key to Deploying, Employing, Sustaining Expeditionary Aerospace Force”, *The Exceptional Release*, No. 71 (Fall 1998): 27.

<sup>12</sup> *Ibid.*

<sup>13</sup> *Ibid.*

<sup>14</sup> Looney, p 7-8.

<sup>15</sup> Zettler, p 27.

## Chapter 2

### Prepositioning

*In war there is no second prize for the runner-up.*

—General Omar Bradley

#### Sea and Land-Based Prepositioning

The two traditional types of prepositioning of assets are sea-based and land-based. As mentioned in Chapter One, sea-based prepositioning is very flexible and effective in supporting deployments but lacks the speed necessary for AEFs. Unless a ship with prepositioned cargo is very close to the deployed location, it cannot reach the crisis area within 72 hours of notification nor could it be off loaded in such a short amount of time.

The U.S. military began relying on purposeful prepositioning of assets in the European theater in the 1960s as a response to the Berlin crisis.<sup>1</sup> It was politically and economically impractical to put more troops and equipment at forward deployed bases, and there were shortfalls in strategic airlift and strategic sealift. Prepositioning of war equipment at selected sites in Europe was chosen as a solution to have quick access to needed supplies in the event of future crises.

This program was first known as 2-plus-10 and quickly became known as Prepositioned Materials Configured in Unit Sets (POMCUS).<sup>2</sup> The POMCUS concept

was heavily exercised in the 1970s and 1980s in popular NATO exercises known as Return of Forces to Germany (REFORGER).

In the late 1970s and early 1980s, prepositioning evolved outside of the European theater to the Southwest Asia (SWA) theater and the Rapid Deployment Joint Task Force (RDJTF).<sup>3</sup> As a response to tensions rising in that region, RDJTF leaders chose prepositioning since no U.S. bases existed in the region and land-based prepositioning had been successful in Europe.

There were many political problems getting permission to store U.S. assets, even without troop presence, in this region of the world. Therefore, land-based prepositioning alone would not suffice, especially if not given access to our assets. This led to the growth of sea-based prepositioning and to alternatives and/or additives to land-based prepositioning.

### **Strategic Airlift and Prepositioning Combined**

The RAND Corporation completed studies for the Air Force in the late 1950s and 1960s comparing alternative combinations of land-based prepositioning and strategic airlift to provide rapid deployment capabilities for tactical air forces in limited wars. The 1958 study used C-133 costs and capabilities and the 1968 study used the C-5A.<sup>4</sup> While cost data for prepositioned assets and C-5 operating costs are outdated, the study and comparison data are still valid and applicable today.

The conclusions of both studies stress that capabilities and costs using various combinations of airlift and prepositioning must be considered. This is one area that will need further research for cost and capabilities comparisons for AEFs. The second RAND study concluded:



Comparing systems with and without prepositioning, the systems with prepositioning show advantages in most situations calling for large-scale quick-response capability, at the expense of less capability in certain areas remote from the prepositioning sites.<sup>5</sup>

Another area to be further researched for an AEF deployment is also applicable:

...the comparisons do not take into account certain costs and problems of prepositioning; these include the costs and political problems of acquiring and maintaining base rights, uncertainties concerning the security and wartime availability of prepositioned materiel, and balance-of-payments and other economic considerations.<sup>6</sup>

A more recent RAND study from the mid 1980s predicted capabilities available in the mid 1990s to improve capabilities to project ground forces to SWA.<sup>7</sup> This study suggested three kinds of prepositioning to be used: land-based, afloat or sea-based, and mobile operational large island (MOLI). MOLI, the study's choice, is basically the idea of a floating air base, similar to an off shore oil well.<sup>8</sup>

The summary of this study's findings also stresses a mix of airlift and prepositioning:

Our analysis suggests that although only prepositioning of equipment permits truly quick force deployment, each system has drawbacks. A mix of systems designed to capitalize on the advantages and compensate for the drawbacks of each is most likely to result in an adequate capability for the United States.<sup>9</sup>

This study also identified some limitations of land-based prepositioning, similar to limitations found in other research. Political issues, particularly access to bases with assets, were limitations as was airport congestion, limiting strategic airlift. A final limitation was lack of flexibility. Since no one knows exactly where the next crisis will take place, assets could be prepositioned far from the action.<sup>10</sup> A conclusion of this RAND report stated: "For rapid response to a contingency in SWA—or in any of several other areas—some prepositioning must be included in any mix of additional systems."<sup>11</sup>

## Summary

This literature review on prepositioning identified the types of prepositioning available, sea-based and land-based, and described some of the limitations of each of these prepositioning strategies. Other research on prepositioning assets for rapid deployments on short notice point out that neither prepositioning nor strategic airlift can do it all; there must a combination of systems.

This review also pointed to several documents describing the start-up of the Rapid Deployment Joint Task force in the early 1980s. Because the deployment aspects of the RDJTF and an AEF are similar, parallels can be drawn between the two. The RDJTF will be explored further in the next chapter.

## Notes

<sup>1</sup> Christie, LCDR David W., “Prepositioning to Support U.S. Army Contingency Operations”, Master’s thesis, U.S. Army Command and General Staff College, 1992. Document call number M-U 42022 C555p, p 10.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid, p 22

<sup>4</sup> Fort, Donald M., “Prepositioning and Airlift for TAC Rapid Deployment in the 1970’s”, RAND Corporation Memorandum RM-5559-ISA, August 1968. Document call number M-30352-9-NO5559, p 1.

<sup>5</sup> Ibid, p 30.

<sup>6</sup> Ibid, p 31.

<sup>7</sup> Dadant, P.M., et al, “A Comparison of Methods for Improving U.S. Capability to Project Ground Forces to Southwest Asia in the 1990s”, RAND Project A.F. Project # R-2963-AF, November 1984. Document call number M-30352-1-U NO 2963, p 2.

<sup>8</sup> Ibid, p x.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid, p 132-133.

<sup>11</sup> Ibid, p 137.

## Chapter 3

### Rapid Deployment Joint Task Force

*While we have a significant airlift capability in the Military Airlift Command, it is not sufficient to put a capital “R” in “Rapid”. That is one of my primary goals.*

—Lieutenant General P.X. Kelley

With tensions on the rise in Southwest Asia in the late 1970s, and the possibility of conflict on the horizon, the Rapid Deployment Joint Task Force (RDJTF) was formed. The RDJTF, the predecessor to today’s U.S. Central Command, was composed of personnel from each branch of the military. Albeit more complex, the basic mission of the RDJTF was to develop the capability to rapidly respond to crises anywhere in Southwest Asia.

The rapidity of this deployment mission was one of the major aspects of the RDJTF (also known as the Rapid Deployment Force, RDF) that was studied and researched. Because a large force would have to quickly deploy to an ill-defined area, the similarities between the RDJTF and the EAF can be seen. The RDJTF immediately looked toward prepositioning in the region because the U.S. had no bases in the theater and because of its success in Europe. Ultimately, the result was limited basing rights in SWA, some land-based prepositioning, and an extensive afloat prepositioning system. Then Lieutenant General P.X. Kelley, Commander of RDJTF, testified before Congress concerning the organizing of the RDJTF:

What the Rapid Deployment Joint Task Force has accomplished, if nothing else, is that it has identified the shortcomings that this Nation has in its ability to project power over vast distances.<sup>1</sup>

This shortcoming is basically that of our strategic mobility capabilities. Similar shortcomings are mentioned in other studies of the RDJTF. Jeffrey Record's description of a Rapid Deployment Force weakness was "Most planned increases in strategic mobility, desirable though they are, fall far short of ensuring the timely arrival of sufficient force..."<sup>2</sup> Maxwell Johnson's writings on the RDJTF point out that "Strategic mobility is the most critical shortcoming of the RDJTF."<sup>3</sup> Also, Robert Haffa's work on limited contingencies points out:

Although a strategic mobility capability remains fundamental to rapid deployment requirements—indeed, all that separates them is warning time—major improvements in logistics have generally not accompanied accelerated changes in strategic concept and organization.<sup>4</sup>

General Kelley did offer an anecdote to the RDJTF's strategic mobility problems:

...I think probably one of the most important things we did was to direct our components to reexamine all of their items of equipment and supplies that will be lifted by strategic airlift, and to cut out anything in the initial flow that would not 'move, shoot, or communicate'.<sup>5</sup>

This may seem indolent, however, it is the essence of being light and lean. In fact, it is a very modern definition of agile logistics and similar to Major General Zettler's comments on being light and lean during AEF's as quoted in Chapter One, "Taking what you know you will need, and not what you think you might need."<sup>6</sup>

Robert Haffa recommends a combination of airlift and prepositioning of assets as a solution to the strategic mobility dilemma. "During the first weeks of mobilization, airlift and prepositioning make their major contributions to a rapid deployment strategy."<sup>7</sup> He goes on to explain and qualify this statement:

The combination of airlifting personnel to ‘marry-up’ with prepositioned equipment has often appeared as the most effective rapid deployment method to a region that can be pre-designated. One of the inherent problems in this synergism is that the equipment must have been prepositioned properly and close to the conflict and remain in good working order.<sup>8</sup>

As with other research on prepositioning referenced in Chapter Two, Haffa also reminds us of the need for access to facilities in the region for land-based prepositioning to be assured.

## Summary

The RDJTF was formed in the early 1980s to give a rapid deployment capability to the SWA theater. The AEF, formed in the late 1990s gives a rapid deployment capability to air forces to any theater. The RDJTF used prepositioning, although mostly afloat, in concert with strategic airlift to supplement strategic mobility and add flexibility.

Since the early days of the RDJTF and more recent deployments during and after the Gulf War, the lack of access to some of our land-based prepositioned assets highlights both the importance of prepositioned assets and a solid strategy to access those assets. The next chapter will address what types of assets we should preposition and where.

## Notes

<sup>1</sup> U.S. House. *Hearings before the Committee on the Budget—Military Readiness and the Rapid Deployment Joint Task Force (RDJTF)*, 96<sup>th</sup> Congress, Second Session, 30 September – 1 October 1980, p 49.

<sup>2</sup> Record, Jeffrey. *The Rapid Deployment Force and the U.S. Military Intervention in the Persian Gulf*, Cambridge, MA: Institute for Foreign Policy Analysis, Inc., 1983, p 61.

<sup>3</sup> Johnson, Maxwell Orme, *The Military as an Instrument of U.S. Policy in Southwest Asia: The Rapid Deployment Joint Task Force, 1979-1982*, Boulder, CO: Westview Press, 1983, p 87.

<sup>4</sup> Haffa, Robert P., Jr., *The Half War: Planning U.S. Rapid Deployment Forces to Meet a Limited Contingency, 1960-1983*, Boulder, CO: Westview Press, 1984, p 241.

## Notes

<sup>5</sup> U.S. House, p 53.

<sup>6</sup> Zettler, Maj Gen Michael E., “Agile Logistics: The Key to Deploying, Employing, Sustaining Expeditionary Aerospace Force”, *The Exceptional Release*, No. 71 (Fall 1998): 27.

<sup>7</sup> Haffa, p 242.

<sup>8</sup> Haffa, p 244.

## Chapter 4

### Prepositioning for the EAF

*Is logistics simply a science of detail? Or, on the contrary, is it a general science, forming one of the most essential parts of the art of war?*

—Antoine Henri Jomini

The EAF concept is too new to have any literature available on logistics strategies in general or prepositioning of assets specifically. However, two comprehensive works on logistics list the advantages of prepositioning stockpiles. In *The Lifeblood of War: Logistics in Armed Conflict*, the British Expeditionary Force valued prepositioned stocks. “Even if they are not exactly in the right place, by being on the right continent, or area of that continent, much movement effort can usually be saved.”<sup>1</sup> In James Huston’s classic work, *The Sinews of War: Army Logistics 1775-1953*, prepositioning is highly valued:

On the basis of experience in the supply build-up in the United Kingdom in World War II and in the roll-up of equipment in the Pacific for the support of operations in Korea, there is something to be said for the suggestion that the United States in cooperation with its allies, should stockpile all kinds of military supplies at strategic points near areas of potential danger in various parts of the world.<sup>2</sup>

Based on a successful history of prepositioning, and on the advantages of prepositioning listed in Chapter Two, it should be investigated as an option for logistics support of the EAF. Also, based on similarities of AEFs and the RDJTF, there should be a thorough investigation not only of what to preposition, but where, due to base access and political issues that can affect land-based prepositioning.

## **What Should be Prepositioned?**

As described in Chapter One, each AEF is built around fighter (shooter) aircraft. Additionally, strategic airlift is a clear choice for the speed, range, and flexibility in strategic mobility needed for AEF deployments. But, strategic airlift aircraft are premium assets that are in short supply. To rapidly deploy needed fighter aircraft support equipment in support of AEFs, prepositioning of those items that take up a lot of strategic airlift, or specifically those items that take up a lot of pallet positions, should be considered. Examples of these types of items are: engines, engine removal and installation trailers, munitions trailers, and mobility readiness spares packages.

Another suggestion for prepositioning are items not specific to aircraft type, since each of the 10 AEFs will not have the same type of aircraft. All fighter aircraft models vary in production runs from engine type to type of munitions they carry. So, support equipment that is not aircraft dependent would add to the flexibility of prepositioning. Some examples are: generic tools/toolboxes, aircraft chocks, tires, maintenance stands, light carts, aircraft jacks, tow bars, liquid oxygen carts, liquid nitrogen carts, and air conditioners. These are also examples of items that could significantly reduce the amount of strategic airlift needed for rapid deployment to the crisis theater.

Another example of what should be prepositioned are those equipment items that are in short supply but are needed to generate aircraft at home station and to regenerate aircraft immediately upon arrival at the deployed location. This would obviously require sourcing or funding of additional equipment, but is certainly a category of items that should be considered in a prepositioning strategy.



## **Where to Preposition?**

Land-based prepositioning is plagued by limitations as described earlier. Some of those are: access to assets if on foreign land, assets may not be in the right region for the crisis and have to be moved, and costs for additional assets or taking assets away from units. The cost of prepositioning will not be discussed here but must be investigated in another study before any final decision is to be made.

Several options for prepositioning locations were considered: Air Logistics Centers, CONUS strategic aerial ports, Pacific and European fighter bases, Regional Contingency Centers, and Pacific and European strategic aerial ports. Each will be discussed below.

**Air Logistics Centers (ALCs).** Locating stockpiles at these locations makes sense from a wholesale logistics supply point of view. Although heavily dependent on the types of assets prepositioned, many could be easily overseen by item and equipment managers. Any parts could possibly be rotated in and out of depot stock to be used to fill requisitions or be used as replacement parts for depot repair. Other equipment could be maintained by equipment specialists and could easily be made shipment ready by Defense Logistics Agency distribution personnel. The biggest drawback for this option is that it doesn't save strategic airlift. Airlift aircraft would have to be sent to ALC bases instead of being used at deploying fighter or bomber units. Another disadvantage of this option is that to ensure assets were always ready for rapid deployment, they couldn't realistically be used to support depot supply or repair. These disadvantages make this option non-viable.

**CONUS Strategic Aerial Ports.** Availability of strategic airlift is what makes this option an advantage and a disadvantage. Prepositioned assets could easily be moved on

short notice if stored here, but strategic airlift would be used. Also, assets would need to be stored, managed, and maintained at these bases. This would require realignment of personnel, since some of the prepositioned items require Air Force specialists who are not assigned to those bases. Because of these drawbacks, this is not a viable option for the EAF.

**Pacific and European Fighter Bases.** Most of the drawbacks of CONUS aerial ports are advantages of overseas fighter bases. Fighter bases would have the right specialists to store and maintain any prepositioned equipment. Also, since these bases are already overseas, they are closer to probable crisis locations than are CONUS bases. Because of their location, strategic airlift isn't necessary. Intra-theater airlift, C-130s, could be used even if the crisis was in a neighboring theater (for example C-130s from Europe could move assets to SWA). However, use of intra-theater airlift can also be a drawback of this option. There are no C-130s stationed at many overseas fighter bases and few at others. Overall, this is still a viable option to be considered.

**Regional Contingency Centers (RCCs).** The RCC concept is to have AEF staging areas allowing the capability to strike anywhere in the world. Proposed locations for RCCs are Roosevelt Roads in Puerto Rico, Diego Garcia in the Indian Ocean, Moron Air Base in Spain, and Anderson Air Base in Guam.<sup>3</sup> These bases would have the advantage of being a hub for AEF activities with appropriate specialists to store and maintain any assets needed. These are excellent locations to support bomber aircraft that are part of an AEF. However, their disadvantage to AEF fighter aircraft and logisticians lies in their location. Strategic airlift would be needed to move any assets, plus it would take valuable time to position this airlift in these locations—possibly eating away at the 72

hours needed to be in place in the crisis area. Because of this disadvantage of sole reliance on strategic airlift, this is not a viable option.

**Pacific and European Strategic Aerial Ports.** These bases have a disadvantage shared by CONUS aerial ports—that of needing specialists to store and maintain prepositioned assets. However, the advantages of overseas fighter bases such as location and access to intra-theater airlift make this a viable option. Our strategic aerial ports overseas have squadrons of C-130s that could move assets anywhere in their theater, or a neighboring theater. This option seems to have the most advantages.

The C-130s at these bases could be used in their traditional intra-theater airlift role or could be used for inter-theater movement. This flexibility allows prepositioned assets to be moved at the same time as the AEF units are moved from their bases, to meet at the deployed location simultaneously. To overcome personnel issues, appropriate specialists could be assigned to aerial port bases and attached to an aircraft maintenance squadron or could be a detachment.

**Table 1. Summary of Prepositioning Locations**

<i>Location Option</i>	<b>Expertise Available</b>	<b>Uses Strategic Airlift</b>	<b>Flexible</b>
<b>ALCs</b>	Yes	Yes	No
<b>CONUS Strategic Aerial Ports</b>	No	Yes	No
<b>Overseas Fighter Bases</b>	Yes	No	Maybe
<b>RCCs</b>	Yes	Yes	No
<b>Overseas Strategic Aerial Ports</b>	No	No	Yes

## Summary

The logistics strategy for AEF deployments should be a combination of strategic airlift and prepositioned assets. Deciding what to preposition should be focused on three main categories: items that take up a lot of room on strategic airlift aircraft, items that can support multiple weapon systems, and items needed immediately upon arrival in theater for regeneration of fighter aircraft. If prepositioning is used to augment strategic airlift, then an option that doesn't require use of more strategic airlift should be chosen.

Pacific and/or European bases give the flexibility necessary to respond quickly, and our overseas strategic aerial port bases have C-130s to work the rapid deployment of AEFs. Even if the crisis is not in the region or theater of our C-130s and prepositioned assets, speed and flexibility allow these assets to arrive simultaneously with the AEF "shooters" and logisticians.

Additionally, our overseas strategic aerial ports are not in countries with histories of basing rights issues, a common problem with land-based prepositioning. Therefore, they are locations that are worthy of further consideration for prepositioned AEF assets.

Despite these ideas, prepositioning is not the complete solution to AEF logistics support during deployments. The next chapter will describe how some logistics initiatives can be used to further improve a logistics plan for supporting AEF deployments.

## Notes

<sup>1</sup> Thompson, Julian, *The Lifeblood of War: Logistics in Armed Conflict*, Exeter, UK: Brassey's, 1991, p 334.

<sup>2</sup> Huston, James A., *The Sinews of War: Army Logistics 1775-1953*, Washington, D.C.: Center of Military History, U.S. Army, 1988, p 661-662.

## **Notes**

<sup>3</sup> Godfrey, Capt Brian M., “A Comparison of Proposed Air Expeditionary Force Packages Using the Thunder Campaign Simulation Program”, Master’s thesis, Air Force Institute of Technology, 1998, p 14.

## Chapter 5

### Innovations to Reduce Deployment Footprint

*When you come to a fork in the road, take it.*

—Yogi Berra

Reducing the deployment footprint of an AEF can be accomplished by prepositioning assets at forward locations, but that is not the only solution. “The key to ensuring today’s Air Force core competencies will meet the challenge of tomorrow is *Innovation*. Innovation is part of our heritage as airmen.”<sup>1</sup> Logistics innovations and new technology can play a role in reducing the AEF deployment footprint.

There are several initiatives that reduce the size, weight, and numbers of equipment we have to deploy, yet maintain the same or increased capability. The Air Force’s AEF Battlelab—a center of innovation established to explore new ideas and foster innovative technologies is championing some of these innovations.<sup>2</sup>

One completed initiative, the Common Boresight System, is a commercial off-the-shelf system for F-16C, F-15C, and F-15E aircraft. This replaces one system for each of these aircraft, and reduces the logistics footprint by 80 percent from 1.5 to 0.3 pallet positions. The new system also reduces boresighting time by over 30% for each aircraft.<sup>3</sup>

Another initiative, the Next Generation Munitions Trailer (NGMT), is currently in the demonstration phase. This new trailer combines advantages of both current trailers,

the MHU-110 and MHU-141, yet requires less maintenance and takes up less room, thus decreasing logistics footprint during deployments.<sup>4</sup>

The AEF Battlelab has identified two proposed initiatives currently in research, the Vertically Challenged Aerospace Ground Equipment (AGE) and the Alternative Powered AGE. Vertically Challenged AGE recognizes that fact that most AGE is very low profile and when loaded on airlift, it quickly exceeds the cube but not the weight of cargo allowed. A method of stacking or loading AGE to use cargo volume more efficiently is being researched. Alternative Powered AGE is researching the possible use of Proton Exchange Membrane (PEM) fuel cells as an alternate source versus the internal combustion engine. This would reduce logistics footprint by eliminating the need for oil, oil and air filters, associated tools and equipment, and spill response kits for AGE.<sup>5</sup>

Additionally, there is a combination generator/air conditioner that takes the inner components of a C-10 air conditioner and packages them so that it can be mounted on top of a -60 generator, thus eliminating the need to deploy several pieces of aerospace ground equipment. In the future, there will not be a need to deploy gaseous and liquid nitrogen carts because of a new self-generating nitrogen servicing cart that is in procurement. Other equipment in development are a composite maintenance stand, which will take the place of B-1, B-2, B-4, and B-5 maintenance stands and can be stacked during deployments to save airlift space, and a replacement for the NF-2 light cart that is about half the present size.<sup>6</sup>

The 388 Fighter Wing's "Falcon Fixer", a mobile repair facility encompassing nondestructive inspection, metals technology, and structural repair equipment is another innovation that not only saves on airlift but also gives increased capability.<sup>7</sup> This facility

replaces numerous palletized roll-away bins and tool boxes, yet increases capability by providing an environmentally controlled work center and state-of-the-art equipment for flexibility in performing maintenance.<sup>8</sup>

These innovations in support equipment are crucial to the future deployment capabilities of the Air Force. The flexibility allowed by these new technological innovations will be necessary to support our concept of light, lean, and lethal Air Expeditionary Forces.

### Summary

Following the Gulf War, General Schwarzkopf said “I can’t give credit enough to the logisticians and transporters who were able to pull this off...”<sup>9</sup> Much of the logistics success in that war was due to innovative logisticians. The Air Force’s *Global Engagement: A Vision for the 21<sup>st</sup> Century Air Force* recognizes the importance of innovation as a part of our heritage as airmen.<sup>10</sup> The future Expeditionary Aerospace Force will need innovative logistics if it is to be successful.

### Notes

<sup>1</sup> *Global Engagement: A Vision for the 21<sup>st</sup> Century Air Force*, Department of the Air Force, p 9.

<sup>2</sup> Ibid.

<sup>3</sup> AEF Battlelab Initiatives. On-line. Internet, 20 January 1999. Available from <http://www.mountainhome.af.mil>.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> Breeyear, CMSgt Timothy, HQ USAF/ILMM, electronic mail correspondence, 5 January 1999.

<sup>7</sup> Hitzler, 2<sup>nd</sup> Lt Ryen S., “Falcon Fixer: Putting All the Pieces in Just One Box”, *The Exceptional Release*, No. 71 (Fall 1998): 36-37.

<sup>8</sup> Ibid, p 37.

<sup>9</sup> Watson, Bruce W., *Military Lessons of the Gulf War*, Presidio, CA: Presidio Press, 1991, p 171.

<sup>10</sup> *Global Engagement*, p 9.



## Chapter 6

### Conclusions and Recommendations

*The whole of science is nothing more than a refinement of everyday thinking.*

—Albert Einstein

#### Conclusions

This research question was stated in Chapter One: Should the Air Force use prepositioned assets to augment strategic airlift during AEF deployments? If so, what types of items should be prepositioned and at what locations? The next few chapters are an attempt to answer those questions. A summary of those answers is given below.

Land-based prepositioning has been very successful in the past, especially when used in combination with strategic airlift. Therefore, the Air Force should develop a solid strategy for the use of land-based prepositioned assets for all AEF deployments. Those assets that take up many pallet positions (large items), assets that support more than one weapon system, and assets that are needed for regeneration of fighter aircraft should be examined in this prepositioning strategy. Additionally, overseas aerial port or fighter bases should be given serious consideration as candidates to store and maintain these prepositioned assets. Finally, prepositioning and strategic airlift alone cannot do it all. There is a need for logisticians to be innovative and develop equipment with more than one use and that saves space.

EAF mobility is like a stool with two legs: strategic airlift and land-based prepositioning. However, this stool is further propped up by logistics innovations.



**Figure 1. AEF Mobility Concepts**

### **Recommendation**

The overall recommendation of this study is for the Air Force to adopt a strategic mobility strategy for AEF deployments that includes a combination of strategic airlift and land-based prepositioning that “marry up” logisticians at the deployed site, while taking advantage of equipment innovations to further decrease the deployment footprint.

The Air Force is committed to experimenting, testing, exercising, and evaluating new operational concepts and systems for air and space power and is providing additional emphasis in these areas with a focused battle laboratory for Air Expeditionary Forces.<sup>1</sup> *Global Engagement: A Vision for the 21<sup>st</sup> Century Air Force* says, “Creating focused battle labs will explore new ideas and foster innovative technologies that will improve the capabilities of our core competencies.”<sup>2</sup> Therefore, the following recommendations are for the AEF Battlelab:

## **Specific Recommendations**

1. Pursue development of AEF “kits” and experiment with placing them at various bases overseas such as strategic aerial ports and fighter wings.

These kits could consist of tools/toolboxes, aircraft chocks, maintenance stands, light carts, or any of the other examples listed in this paper. There needs to be a survey of previous units that deployed as part of an AEF to determine the types of assets that were interchangeable among the various weapon systems. Additionally, the 4404<sup>th</sup> Wing (provisional) at Prince Sultan Air Base, Saudi Arabia, or the 39<sup>th</sup> Wing at Incirlik Air Base, Turkey may be valuable sources of information in this endeavor. Both of these bases continually host units from throughout the Air Force. After deciding on the composition of a “kit”, small scale tests should be conducted to determine if the right types of items are included. These tests can be conducted by prepositioning these kits overseas at both strategic aerial port and fighter bases. Then, use a future AEF deployment to not only work out of these kits, but to test the reduced footprint by leaving those items behind and the “marry up” portion of moving the kits via intra-theater airlift to the deployed destination.

2. Determine how much strategic airlift could be saved for a fighter wing deployment in support of an AEF.

Using some of the examples given in this paper, determine how many pallet positions of cargo could be saved if those assets were prepositioned. This can be accomplished by using the 366<sup>th</sup> Composite Wing at Mountain

Home AFB, also the same location as the AEF Battlelab. The composite wing at Mountain Home AFB has participated in past AEFs and has the added benefit of having multiple aircraft types. A team of maintenance personnel from the 366<sup>th</sup> and from the Battlelab could work with Logistics Plans personnel at Mountain Home AFB to determine how removing some items from the deployment package could affect deploying strategic airlift aircraft load plans.

3. Determine the cost of prepositioning.

Using methods similar to the RAND reports mentioned in this paper, complete a cost comparison of airlift and prepositioning. Air Mobility Command should be able to provide the Battlelab with airlift costs for each strategic airlifter in the inventory. When determining prepositioning costs, compare costs of new procurement with that of having units “donate” assets and thus operating without them. In other words, there will be some lost capability if new assets aren’t procured. That loss should be quantified or qualified. This recommendation will be very difficult to complete because it is an exercise in efficiency versus effectiveness. Costs by themselves will certainly determine which method or methods are the most efficient. However, research for the project has shown that a combination of strategic airlift and land-based prepositioning are the most effective for a short notice, rapid deployment. These factors must be considered when determining costs.

4. Work toward commonality of support equipment.

Some of our fighter aircraft are over 20 years old, and we are testing a new fighter, the F-22. Any new or newly designed support equipment should satisfy the needs of multiple weapon systems, much like the innovative logistics support equipment mentioned in Chapter Five. There should be a review of support equipment being developed to determine if it can be used to support our fleet, not just a specific aircraft. This review of equipment can be accomplished by contacting equipment item managers at logistics centers and by contacting the Air Force Research Laboratory at Wright-Patterson AFB.

5. Consider commonality of weapon systems when aligning each of the 10 AEFs

There are numerous derivations of each of our fighter aircraft, each requiring differing logistics support equipment and specialists. For example, among fighter aircraft there are two completely different engine manufacturers, Pratt & Whitney and General Electric, not to mention the various types of engines manufactured by these companies. The F-16 in particular has numerous production variations. Each of these aircraft variations, known as blocks, require differing aircraft maintenance personnel and equipment. If similar aircraft could be assigned to the same AEF, the logistics tail could be cut considerably. Obviously this isn't the primary consideration in the make-up of an AEF, but it is one area that should be considered. The Battlelab's logisticians need to make these

considerations known to their planning counterparts at the Battlelab and at Air Staff.

6. Work with future programs to ensure logistics support is considered for rapid mobility.

Programs such as the Advanced Strike Fighter (ASF) should be aware of the AEF logistics concepts so that integrated logistics support can take full advantage of reducing the deployment footprint when that aircraft is fielded. The AEF Battlelab should contact the ASF system program office and keep them abreast of AEF developments. Additionally, it is unknown at this time if Unmanned Aerial Vehicles (UAVs) will be considered as parts of an AEF, but their support equipment needs should also be examined in the same context as current and future systems' equipment.

### **Notes**

<sup>1</sup> *Global Engagement: A Vision for the 21<sup>st</sup> Century Air Force*, Department of the Air Force, p 9.

<sup>2</sup> Ibid.

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